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has been exposed for some time to the atmosphere, and which consequently contains a certain quantity of the red oxide of iron diffused through it. I should recommend the infusion of galls to be made of considerably greater strength than is generally directed, and I believe that an ink formed in this manner will not necessarily require the addition of any mucilaginous substance to render it of a proper consistence.

I have only to add further, that one of the best substances for diluting ink, if it be, in the first instance, too thick for use, or afterwards become so by evaporation, is a strong decoction of coffee, which appears in no respect to promote the decomposition of the ink, while it improves its colour, and gives it an additional lustre.

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No. V.

RAISIN WINE.

*Description of a method of making Raisin Wine, by  
A. AIKIN, Secretary, F.L.S. F.G.S. &c.*

I HAVE for some years been in the habit of making, for use in my own family, a light, dry raisin wine; I have also noted down, with more or less minuteness, the progress and result of several of these experiments; and I beg leave now to offer them to the Society, in the hope that thereby some additional light may be thrown on a very important branch of domestic economy.

It appeared to me, from some previous comparative

trials with black currants, and with others of our native fruits, that none of them are so well adapted to make light dry wines as the better kinds of raisins: a farther advantage attends the use of this latter fruit, that the wine may be made at the season when the temperature is most favourable to the due progress of the fermentation.

The raisin which I have been most in the habit of using, and which I prefer, is the Muscatel. It is imported in boxes, containing about twenty pounds; and, when new, is in common use as a table fruit. In this state it would, doubtless, make a wine of excellent quality; but its price prohibits its employment for this purpose. In those which remain unsold for about a year, the rich pulp of the recent raisin becomes mixed with sugary concretions which render it less acceptable at the dessert; and the price of such fruit, being from tenpence to a shilling a pound, brings it within the reach of the domestic wine-maker.

That matter, whatever it be, which, through the process of fermentation, converts a solution of sugar into vinous liquor, exists in raisins in sufficient abundance to change into wine a greater quantity of sugar than the fruit itself contains; and I have found it advantageous, both as regards the price and the quality of the product, to add to any given quantity of raisins from one-tenth to one-third of their weight of sugar. In order, however, to avoid tainting the wine with the peculiar flavour of cane-sugar, I use good loaf, at the average price of 10*d.* or 11*d.* a pound.

In my early experiments I poured hot water on the raisins, and allowed them to remain therein twelve hours, more or less: by this time the raisins were plumped up, and I pressed them between fluted wooden rollers, in

order to break the skins and press out the juice. This process, however, by no means succeeded to my wish; the rollers were clogged and strained by the fruit which adhered to them, and many of the berries, in consequence of the toughness of their skin, passed through the rollers entire. I therefore adopted, the plan of having the raisins chopped (without previous maceration) on the same kind of tray, and with the same kind of chopper, as is used in making minced meat; and I have had no reason to vary from this method, except that of late I have directed the raisins to be chopped finer than they were at first. Previous to the raisins being chopped, the stalks are separated for a use that will be mentioned hereafter.

I have tried several proportions of ingredients, but those from which I have obtained the best results are, three pounds of raisins and one pound of sugar to an ale gallon of water.

I prepare the must sometimes by mashing, sometimes by maceration.

The mashing is performed in the following manner:—The chopped raisins being put into an open tub or earthenware pan, I pour on them hot water, in the proportion of about a quart to four pounds of fruit. My object, in this first mash, is to extract the greater part of the saccharine mucilage as little altered as possible; I therefore heat the water no higher than about 120° Fahr.: the water and fruit are mixed, and, after standing for about a quarter of an hour, the whole is stirred together as accurately as possible by hand, taking care to break down all the lumps, and, in a few minutes afterwards, is placed on a sieve over a tub, where it drains for

a short time: the husks are then lightly pressed by hand, and are returned to the mash-tub.

The second mash is made exactly in the same manner as the first; and the husks, after pressing, are returned again to the mash-tub.

They will now be found to have lost the whole of their clamminess, though they are still sweet; I therefore conclude that the saccharine mucilage is now for the most part extracted, and my principal object in the subsequent mashes is to dissolve out the tartar. For this purpose the water of the third mash is put on at the heat of  $150^{\circ}$  or  $160^{\circ}$ , and is conducted in the same manner as the former. The liquor thus obtained is considerably acidulous, having the flavour of the raisins and but little sweetness. Three-fourths of the mash being now made, it is tasted in order to ascertain whether it is sufficiently astringent, and according to the intended astringency of the wine, I either altogether reject the stalks or use the whole or a part of them. If a somewhat astringent wine is intended, the last mash is thus prepared: I pour boiling water on the stalks, in a separate tub, and after they have been macerated for about a quarter of an hour, I pour the liquor on the husks and mix them well with it: in a quarter of an hour more the liquor is put on the sieve and the husks are well squeezed by hand.

While the last mash is preparing, I transfer the liquor of the first three mashes to the fermenting tun, and dissolve the sugar in it: I then add as much of the last mash as is requisite to bring the must to the due proportions, viz. one ale-gallon of must to three pounds of fruit and one pound of sugar. The time occupied by the above processes is four or five hours, and the temperature

of the must, when put in the fermenting tun, is usually about  $70^{\circ}$ .

If the weather is warm and apparently more likely to become hotter than colder, I pour the must into the fermenting tun with as little agitation as possible; but if the weather is cool and not likely to get warmer, I dash each pailful against the sides of the tun, pouring it in from as great a height as I can conveniently reach: by this means it is more mixed with atmospheric air; and liquor thus treated will often begin to ferment in less than twelve hours. If the must is at the temperature of  $70^{\circ}$ , fermentation begins in from twelve to thirty-six hours, according as it is treated; and the scum which rises is sometimes taken off every day, and sometimes allowed to remain till the liquor is about to be removed from the fermenting tun. If the fermentation is languid, I keep on the cover of the tun and stir the scum daily into the liquor: if too rapid, I take off the cover and remove the scum as it rises.

The lowest temperature at which I have observed fermentation to take place is  $48^{\circ}$ . On this occasion the must was at  $48^{\circ}$  when it was put into the tun, the temperature of the cellar being  $46^{\circ}$ . On the next morning it was at  $47^{\circ}$ , and on the second morning at  $46^{\circ}$ ; the temperature of the cellar remaining the same: on the third morning both the liquor and cellar were at  $45^{\circ}$ , no signs of fermentation having yet appeared. The liquor was then placed before a fire for some hours, and fermentation began; it was then removed to the cellar, and on the fourth day the fermentation was going on steadily but slowly at  $48^{\circ}$ . I have never made wine when the heat of the air was above  $70^{\circ}$ , and, on the whole, I prefer a temperature of from  $55^{\circ}$  to  $60^{\circ}$ . That

of the liquor, after the second day, continues about 2° above that of the cellar till the eighth or ninth day, when the fermentation has usually become languid, and the heat of the liquor and of the cellar at that time rarely differ more than one degree.

The liquor is now vinous but sweet; and after carefully skimming it, I transfer it to glass carboys, containing about six or seven gallons, or to stoneware barrels of the same size.\* I insert in the bungs glass tubes of safety, and, on the second day, pour into them about an inch of quicksilver to exclude the air. The cement that I use for covering the bungs is a mixture of wax and resin.

Carbonic acid continues to bubble through the quicksilver in the safety tube for some weeks; after which it ceases; but the column of quicksilver in the exterior leg of the syphon is always higher than that in the interior leg. I have never seen a single instance of the outer air passing into the carboy.

The loss during the fermentation in the tun is about 6 per cent; subject, however, to variations from the temperature of the liquor, from the scum being removed once or oftener, and from the cover of the tun being left on or off.

I think the wine ought to remain an entire summer in the cask or carboy, in order that the fermentation may proceed so far as almost entirely to decompose the sugar; and as my usual times of wine-making are April and

\* As barrels of stoneware are always more or less porous, they should be warmed thoroughly before a fire and rubbed over with a mixture of bees'-wax and turpentine (about one part of turpentine to three of bees'-wax): when this thin coating is grown cold, it should be well rubbed in with a hard brush.

October, that made in the former month is bottled in the March following, and that made in October is bottled about the end of September, or a week or two later, according to circumstances.

I never fine the wine, being of opinion that the light dry wine which it is my aim to produce would be materially injured by being deprived of its tannin through the action of isinglass or any similar substance.

At the time of bottling I have seldom observed the wine to have any very sensible flavour,—meaning by flavour that compound sensation of smell and taste which characterises the finer kind of wines; but after remaining for a year in bottle, a flavour resembling elder flowers is strongly developed, mingled generally, in a slight degree, with that of prussic acid.

As soon as the wine begins to run turbid from the carboy, I pass the whole of what remains through a flannel filter; but though I am careful that the wine, when bottled, should be clear though not bright, there is always more or less of flocculent matter deposited, which requires the bottles to be set upright in the bin, and to be decanted with care.

The wine, when first decanted, is often of a very pale yellow colour, especially if high flavoured; but in an hour or two it deepens more or less, and at length acquires a tint like that of Bucellas, the prussic acid flavour at the same time disappearing.

Instead of mashing as above described, I have sometimes pursued a still more simple way,—that of *maceration*; by mixing in the fermenting tun the usual proportions of chopped raisins and sugar with cold water, and leaving the raisins in the liquor during the whole of the first fermentation. By this method I obtain a higher-coloured



wine; but, the fermentation being generally slower and consequently longer, it is destitute of that Frontignac or elder-flower flavour which it generally acquires when treated according to the first process, and is apt to get a less agreeable flavour from the husks of the raisins. Sometimes, however, the method succeeds very well; and the elder-flower flavour not being pleasant to many persons, such wine is more generally acceptable than the former.

In May 1827 I made some wine in the way last described. The materials were put together on the 3d day of the month, the temperature of the liquor and of the cellar being  $56^{\circ}$ . On the 5th, at night, fermentation had just begun, the temperature of the liquor and cellar being  $57^{\circ}$ . On the 7th the liquor was  $58^{\circ}$ . From that time to the 19th fermentation went on, though languidly, the temperature of the liquor varying from  $57^{\circ}$  to  $58\frac{1}{2}^{\circ}$ , and that of the cellar from  $55^{\circ}$  to  $57^{\circ}$ . From the 19th to the 24th the weather became warm, the temperature of the cellar rose to  $59^{\circ}$ , and that of the liquor to  $61^{\circ}$ . It had now been twenty-one days under fermentation, and therefore, though it was still rather too sweet, I put it into carboys, and bottled it about half a year afterwards. This wine is now (December 1828) strong, dark-coloured for white wine, but still rather sweet, and tastes too much of the husks.